Description

SPRAYLESS SURFACE CLEANER

Technical Field

This invention relates to a tool for cleaning surfaces, and more particularly, to a tool for cleaning flooring surfaces, wall surfaces and upholstery. The tools utilize a cleaning fluid but do not include spray nozzles and therefore eliminate the problems associated therewith. The invention also relates to a method of delivering cleaning fluid to any one of a number of different tools. The cleaning fluid flows to the surface to be cleaned by traveling along the edge of the tool in a thin sheet, maintaining higher temperatures and allowing more complete recovery of the fluid and a reduced drying time.

Background of the Invention

Since the first installation of carpeting and upholstery, there have been innumerable ways and theories as to the best approach for keeping the carpeting and other fabric material clean, including wet versus dry cleaning, deep versus shallow cleaning, and invariably an equal number of instruments or tools to effect the cleaning process. The most commonly used cleaning method today is the process of applying cleaning fluid as a spray under pressure to the surface to both dissolve the dirt and stains and to scrub the fibers and simultaneously apply a vacuum or negative pressure to extract the cleaning fluid and the soil captured thereby. Although this relatively high pressure method is the method most commonly used, it has some disadvantages. First, it must be remembered that the very nature of the soiled surface defines that the majority of the soil will be at or near the surface of the fibers and, therefore, a high pressure cleaning tends to drive some of the surface soil and cleaning fluid deeper, thereby requiring a very powerful vacuum system to extract

those particles which have been driven beneath the outermost surface. Further, the use of cleaning fluid under pressure, applied through conventional jets, likewise drives the fluid itself deeper, and the fluid that is not immediately removed by the vacuum source takes a significantly longer amount of time to dry. Again, an inconvenience; but further, if the carpeting is used prior to the time it is completely dry, it is more likely to become soiled. Further, the sprayed fluid is atomized and comes into contact with the air, causing significant heat loss, diminishing the cleaning power of the fluid.

Numerous different approaches to spraying cleaning fluid under pressure and then removing it with a vacuum are illustrated in the prior art supplied herewith but will not be discussed in detail.

Another approach to the cleaning of carpeting and upholstery has been the use of a rotating device wherein the entire machine is transported over the carpeting while the cleaning head is rotated about a vertical axis. Typically, these machines include a plurality of arms, each of which includes one or more spray nozzles or a vacuum source providing a more intense scrubbing action since, in general, more scrubbing surfaces contact the carpet. These devices are primarily illustrated in the patents granted to Monson, and again, these devices are listed in the prior art known to the inventor but not discussed in detail herewith.

A third body of material wherein the cleaning fluid is either attempted to be deflected or otherwise controlled is illustrated hereinbelow.

U.S. Patent No. 4,137,600, granted to Albishausen on February 6, 1970, discloses a cleaning apparatus wherein the cleaning fluid is changed into a liquid curtain by a baffle within the cleaning head.

U.S. Patent No. 4,335,486, granted to Kochte on January 22, 1982, discloses a surface cleaning machine wherein the cleaning fluid is deposited upon the surface of the carpet pile from a wick like device which is wetted with the cleaning fluid.

U.S. Patent No. 4,649,594, granted to Grave on March 17, 1987, discloses a cleaning head wherein the cleaning solution is sprayed through a narrow passage and some is wicked along the surface of the passage.

U.S. Patent No. 5,157,805, granted to Pinter on October 27, 1992, discloses a method and apparatus for cleaning a carpet wherein the cleaning fluid is sprayed by nozzle against the back of a striker plate and then flows downwardly and through the carpet to a pickup vacuum.

U.S. Patent No. 5,561,884, granted to Nijland et al on October 8, 1996, discloses a suction attachment spray member wherein the fluid is sprayed against the distributor plate, which creates a planar diverging liquid jet substantially filling the vacuum chamber.

Disclosure of the Invention

The present invention in its broadest sense deals with the distribution of fluid to a surface for cleaning purposes. The fluid is distributed through a slot in a manifold which is in contact with the surface and the slot is effectively at an angle to the surface to be cleaned. The fluid is delivered in a thin film which because of fluidic attraction follows the contour of the edge of the slot, passing through the upper surface of the carpet or fiber being cleaned without having been formed into discrete particles as with spraying, thus maintaining a hotter liquid, and also allowing a more complete pickup and/or recycle of the fluid, since a greater portion moves directly to the vacuum return, reducing the amount of fluid left on the surface because of a lesser penetration, and thus reducing the subsequent drying time.

In addition to the above advantages, the current invention essentially eliminates the problem of overspray when the cleaning head is not immediately adjacent the surface to be cleaned.

With the above-noted prior art and objects in mind, it is an object of the present invention to provide a cleaning nozzle wherein the cleaning fluid is moved as a sheet along

the edge of the nozzle and distributed as a film through the upper portion of the material to be cleaned and is immediately removed along with the grime.

Another object of the present invention is to provide a cleaning bar which is moved over the upper surface of the material to be cleaned, the bar dispenses a cleaning fluid which penetrates the upper portion of the material dissolving the soil, which is then immediately vacuumed away, leaving a clean and substantially dry surface.

Still another object of the present invention is to provide a distribution manifold for cleaning fluid including a lower distribution surface and a distribution slot at an angle to the surface to be cleaned, allowing the fluid to flow over the edge of the slot and into the upper portion of the surface to be cleaned in a film.

Still a further object of the present invention is to provide a cleaning method wherein the cleaning fluid is distributed through a tubular member which is moved laterally across the surface to be cleaned, said tubular member having a longitudinal slot at an obtuse angle to the radius, allowing the fluid to be distributed as a film along the surface outside the slot and the surface to be cleaned.

Yet another object of the present invention is to provide a cleaning system having a cleaning fluid-applying device which substantially reduces the amount of fluid left on the cleaned surface while also substantially eliminating the problem of overspray.

Still a further object of the present invention is to delivery fluid to an adjacent surface in a thin, continuous film, controlling the amount of fluid and depth of penetration of the fluid.

Brief Description of the Drawings

Figure 1 is an environmental view showing a self-contained carpet cleaning apparatus, which is one type that could utilize the present invention.

Figure 2 is an isometric view of the cleaning head for the machine shown in Figure 1.

Figure 3 is a sectional view through the lower portion of a cleaning head showing one version of the present invention.

Figure 4 is a vertical section of the lower portion of a cleaning head showing another embodiment of the present invention.

Figure 5 is an enlarged cross-section through the fluid-applying element of the present invention as shown in Figure 4.

Figure 6 is a top plan view of a rotary cleaner which could incorporate the present invention.

Figure 7 is a vertical section through one of the cleaning heads in the device of Figure 6.

Figure 8 is an isometric representation of the cleaning head of Figures 6 and 7 further disclosing the present invention in its working environment.

Figure 9 is an alternate embodiment wherein the fluid delivery is adjacent the vacuum.

Figure 10 is yet another embodiment with the fluid delivery adjacent the vacuum.

Best Mode for Carrying Out the Invention

As seen in Figure 1, the cleaning system for the present invention includes a main receptacle 2 into which the soiled fluid is returned via vacuum hose 4 interconnected with nozzle 6. Mounted above the receptacle 2 is the vacuum motor and the supply of a cleaning material supplied via tube 10. It is to be understood that this cleaning system could be track-mounted.

As better seen in Figure 2, the carpet cleaning head 6 includes a rigid vacuum tube 12 and a rectangular, downwardly open truncated pyramidal envelope 14 which would contain the spray which is generally applied in prior known cleaning methods as well as forming the plenum for the vacuum returning the soiled liquid to the source.

As best shown in Figures 3, 4, 9 and 10 which are four separate embodiments, are the improved means for applying the cleaning fluid without the inherent problems of spray

escaping. The front and back of the cleaning head are depicted as 16 and 18, which with the end panels (not shown) define a rectangular tip which defines lower surface contact the area of the floor to be cleaned, which is momentarily subjected to the cleaning environment. Securely mounted (see Figure 3) to the interior of the cleaning head is a downwardly open fluid supply means having a first wall 20 terminating in a head 22 and a second wall 24 terminating in an inwardly turned foot 26. The cleaning fluid which is supplied in a steady stream downwardly between the walls 20 and 24 flows outwardly in a sheet past foot 26 and around bead 22 to be applied uniformly to the carpet or other material, and then vacuumed up to the return tank. The utilization of a sheet of fluid which flows down the nozzle head eliminates the cooling of the fluid caused by transforming it from a solid into droplets, reduces the amount of fluid being used for a particular job, and further eliminates the problem of overspray should the cleaning head be inadvertently moved from the surface or tilted so one edge is raised.

A second embodiment of the present invention is shown in Figure 4, wherein walls 16 and 18 can again be seen, terminating adjacent the floor surface to be cleaned. Mounted between the two walls is a horizontal tube 28 having an angled slot 29 supplied by conduit 30 and mounted by means of brackets 32, 34 within the cleaning head.

Reference is now had to Figure 5, wherein the tube or manifold 28 is enlarged to show the slit or groove 29, which is at an acute angle to the supporting floor or at an obtuse angle to the radius taken at the point of intersection with the circular cross-section. It is important to know at this point that the width of the slit 29 and the angle to the floor are critical elements in the proper functioning of the present invention and the appropriate application of the cleaning fluid.

As seen in Figure 6, the present invention could be used in an alternate embodiment such as that taught by Monson in U.S. Patent No. 4,441,229, wherein cleaning and vacuum heads 40 and 42 are mounted to a plurality of arms which are rotated about a hub 44.

Referring now to Figure 7, which is a vertical section through the cleaning head 40, it can be seen that the supply conduit 28 is securely mounted between the walls 16 and 18 by brackets 46, 48 and in contact with the floor surface or uniplanar with the bottom edges of the walls 16, 18.

Although the embodiment shown in Figures 6-8 depicts six arms, two of which dispense fluid, it is to be understood that other combinations could easily be used.

As seen in Figures 9 and 10, the fluid supply, since it is not sprayed, need not be contained in an envelope. In Figure 9, fluid flows downwardly between wall 50 which terminates in foot 52 and wall 54 which terminates in head 56, and forms a sheet flowing over head 56. The fluid is returned by vacuum between walls 54 and 58. The head shown in Figure 10 is of one piece, with the fluid exiting through angular slot 60, flowing along bottom surface 62, and being removed through vacuum opening 64.

Thus, as can be seen, the present invention provides a way to safely and efficiently clean carpeting and the like while reducing the heat loss of cleaning fluid used for a particular job, avoiding the problem of overspray, and, perhaps most importantly, to allow the carpet to be dried more quickly, since there is less penetration and therefore more fluid is extracted. It is further to be noted that the fluid is not sprayed upon the carpet prevents it from driving the soil further into the nap.

Although a preferred embodiment of the invention has been disclosed herein for illustration, it should be understood that various changes, modifications and substitutions may be incorporated in such embodiment without departing from the spirit of the invention, which is defined by the claims as follows.

What is claimed is: